

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.A: Interdependent Relationships in Ecosystems**

Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.A: Interdependent Relationships in Ecosystems**

In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.A: Interdependent Relationships in Ecosystems**

Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.A: Interdependent Relationships in Ecosystems**

Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**

Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.C: Ecosystem Dynamics, Functioning, and Resilience**

Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)

**DCI: Ecosystems: Interactions, Energy, and Dynamics**

**MS.LS2.C: Ecosystem Dynamics, Functioning, and Resilience**

Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)

**DCI: Biological Evolution: Unity and Diversity**

**MS.LS4.D: Biodiversity and Humans**

Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on— for example, water purification and recycling. (MS-LS2-5)

**DCI: Engineering Design**

**MS.ETS1.B: Developing Possible Solutions**

There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-LS2-5)